TWO TONE A.F. SIGNAL
GENERATOR TYPE 745

INSTRUCTION MANUAL

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TWO TONE A.F. SIGNAL GENERATOR TYPE 745

C O N T E N T S

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1. General

This Plug-In is designed to provide simultaneously two independent Audio signals for the evaluation of intermodulation distortion on Amplifiers, Transmission Links and Single Sideband Circuits. Each Audio Signal can also be used separately for straight harmonic distortion analysis.

It consists of two identical R-C tuned oscillators of high stability and very low harmonic distortion. The frequency and output level of these oscillators can be varied independently and the outputs are combined in a resistive adding network with negligible intermodulation and frequency pulling and fed to a common 600Ω output attenuator.

2. Specification

Each Oscillator

Frequency Range:	30c/s - 30Kc/s in three ranges.
Setting Accuracy:	3% ± 3c/s
Frequency Stability (Short term):	0·01%
Output Level:	0-3V open circuit
Setting Accuracy:	± ·5db
Harmonic Distortion:	0·1% (less than 1% below 300c/s).
Hum and Noise:	0·05%

Overall Specification

Inherent Intermodulation	Better than 80db
Output Attenuator:	0-80db in 10db steps
Output Impedance:	600Ω ±2%

3. Operation

The Two Tone Signal Generator Plug-In is ready for use as received from the factory and when inserted into the Type 70 or 70/R Meter Unit will give the specified performance after about 15 minutes warm-up time. The main function switch in the centre of the front panel has three positions marked A, A & B and B. In the two extreme positions only signal A or signal B is switched to the output attenuator and hence the output terminals, but in the centre position both the signals are combined and at the same time the meter circuit which monitors the output level of the signals is disconnected as it would give a completely false reading. The frequency of each oscillator is set by the three position range switch and the continuous tuning dial and the output level by the appropriate level setting potentiometers. The output level attenuator which is common to both signals provides for setting the open circuit output voltage from 3 Volts down to 300μV when the meter reads full scale in 9 steps of 10db attenuation per step.

The internal output impedance of the instrument is 600Ω and constant irrespective of attenuator setting. Therefore the actual voltage V appearing across the output terminals will depend on the load resistance R and is given in terms of the open circuit voltage E as measured on the meter by the following formula

$$V = E \times \frac{R}{600+R}$$

4. Technical Description

The circuit diagram is shown in drawing BC.1189 and as the two oscillators are identical only Tone "A" Oscillator will be described. The oscillator used is of the "Wien Bridge" type where V_1 and V_2 comprise the maintaining amplifier. The triode section V_2B is used as a directly coupled cathode follower to provide a low impedance output for the Wien Bridge feedback network. Positive feedback is applied via the Wien Bridge to the grid of V_1 which induces oscillations at the "resonant frequency" of the network while negative feedback is applied to the cathode of V_1 through the thermistor TH.1 to stabilise the output amplitude. The Wien Bridge network is switched in three stages by switch S_1 which brings in different values of capacitance for the different ranges and is continuously tuned across each range by the ganged potentiometer RV_1 and RV_2. Because both the H.T. and heater supply voltages of the oscillator valves are stabilised, this results in good frequency stability with mains variation and virtually no mains hum at the output.

The output voltage is taken from the cathode of V2B to the "Level" potentiometer RV5 and hence to the output cathode follower V_3. This is of the augmented type with additional feedback from the anode of V3A to the grid of V3B resulting in an output impedance of only a few ohms. This now drives, via the function switch S3, the star network of R40, R41 and R42 which combines the signals and applies them to the output attenuator. The signal is also applied to the rectifier MR3 and passed to the metering circuit via the pre-set potentiometer RV7.

The output attenuator is shown in drawing AC 1108 and consists of one 10db T-pad, one 20db T-pad and two 30db π-pads all of 600 ohms impedance. Switch S4 switches the various pads so as to get attenuation from 0 to 80db in 10db steps, i.e. an output voltage of 3V to 300μV in 3, 1, 0.3 sequence.

P A R T S L I S T

CIRCUIT REF.	DESCRIPTION	
A T T E N U A T O R		
R50.	Resistor, Hi-Stab	491Ω ± 1% ¼W
R51.	Resistor, Hi-Stab	312Ω ± 1% ¼W
R52.	Resistor, Hi-Stab	121Ω ± 1% ¼W
R53.	Resistor, Hi-Stab	312Ω ± 1% ¼W
R54.	Resistor, Hi-Stab	422Ω ± 1% ¼W
R55.	Resistor, Hi-Stab	491Ω ± 1% ¼W
R56.	Resistor, Hi-Stab	639Ω ± 1% ¼W
R57.	Resistor, Hi-Stab	639Ω ± 1% ¼W
R58.	Resistor, Hi-Stab	639Ω ± 1% ¼W
R59.	Resistor, Hi-Stab	9.5kΩ ± 1% ¼W
R60.	Resistor, Hi-Stab	639Ω ± 1% ¼W
R61.	Resistor, Hi-Stab	9.5kΩ ± 1% ¼W
S4.	Switch	Dymar Drawing No. BD 1185

P A R T S L I S T

CIRCUIT REF.	DESCRIPTION			

R E S I S T O R S

R1.	Hi-Stab	2·7KΩ	± 1%	¼W
R2.	"	2·7KΩ	± 1%	¼W
R3.	"	4·7KΩ	± 1%	¼W
R4.	"	4·7KΩ	± 1%	¼W
R5.	Carbon	100Ω	± 5%	½W
R6.	"	100Ω	± 5%	½W
R7.	"	15KΩ	± 5%	½W
R8.	"	1KΩ	± 5%	½W
R9.	"	15KΩ	± 5%	½W
R10.	"	1KΩ	± 5%	½W
R11.	"	1KΩ	± 5%	½W
R12.	"	1MΩ	± 5%	½W
R13.	"	1KΩ	± 5%	½W
R14.	"	1MΩ	± 5%	½W
R15.	"	33KΩ	± 5%	½W
R16.	"	1KΩ	± 5%	½W
R17.	"	33KΩ	± 5%	½W
R18.	"	1KΩ	± 5%	½W
R19.	"	33KΩ	± 5%	½W
R20.	"	33KΩ	± 5%	½W
R21.	"	10KΩ	± 5%	2W
R22.	Hi-Stab	2·2KΩ	± 1%	1W
R23.	Carbon	10KΩ	± 5%	2W
R24.	Hi-Stab	2·2KΩ	± 1%	1W
R25.	Carbon	1KΩ	± 5%	1W
R26.	"	1·5MΩ	± 5%	½W
R27.	"	1MΩ	± 5%	½W
R28.	"	1KΩ	± 5%	1W
R29.	"	1·5MΩ	± 5%	½W
R30.	"	1MΩ	± 5%	½W
R31.	"	1MΩ	± 5%	½W
R32.	"	1MΩ	± 5%	½W
R33.	"	2·7KΩ	± 5%	1W

P A R T S L I S T

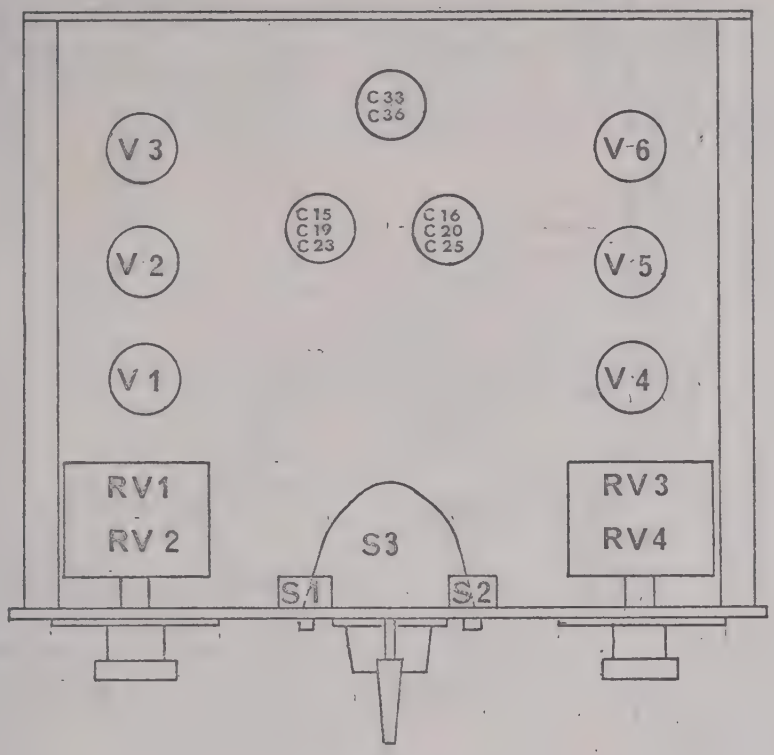
CIRCUIT REF.	DESCRIPTION			
	R E S I S T O R S			
R34.	Carbon	2·2KΩ	± 5%	½W
R35.	"	2·7KΩ	± 5%	1W
R36.	"	2·2KΩ	± 5%	½W
R37.	"	1KΩ	± 5%	1W
R38.	"	1KΩ	± 5%	1W
R39.	"	1KΩ	± 5%	½W
R40.	Hi-Stab	1·8KΩ	± 1%	¼W
R41.	"	1·8KΩ	± 1%	¼W
R42.	"	1·8KΩ	± 1%	¼W
R43.	"	100KΩ	± 1%	¼W
R44.	Carbon	22K	± 5%	1/3W
R45.	"	22K	± 5%	1/3W
RV1.) RV2.)	Dual Ganged potentiometer Inverse semi-log law,	50KΩ	± 5%	
RV3.) RV4.)	Dual Ganged potentiometer Inverse semi-log law,	50KΩ	± 5%	
RV5.	Potentiometer, linear	100KΩ		½ watt
RV6.	Potentiometer, linear	100KΩ		½ watt
RV7.	Potentiometer, linear	22K		
	C A P A C I T O R S			
C1.	Plastic Film	0·1μF	160V d.c.	
C2.	" "	0·1μF	160V d.c.	
C3.	Polystyrene	0·01μF	125V d.c.	
C4.	"	0·01μF	125V d.c.	
C5.	"	940pf	125V d.c.	
C6.	"	940pf	125V d.c.	
C7.	"	940pf	125V d.c.	
C8.	"	940pf	125V d.c.	

P A R T S L I S T

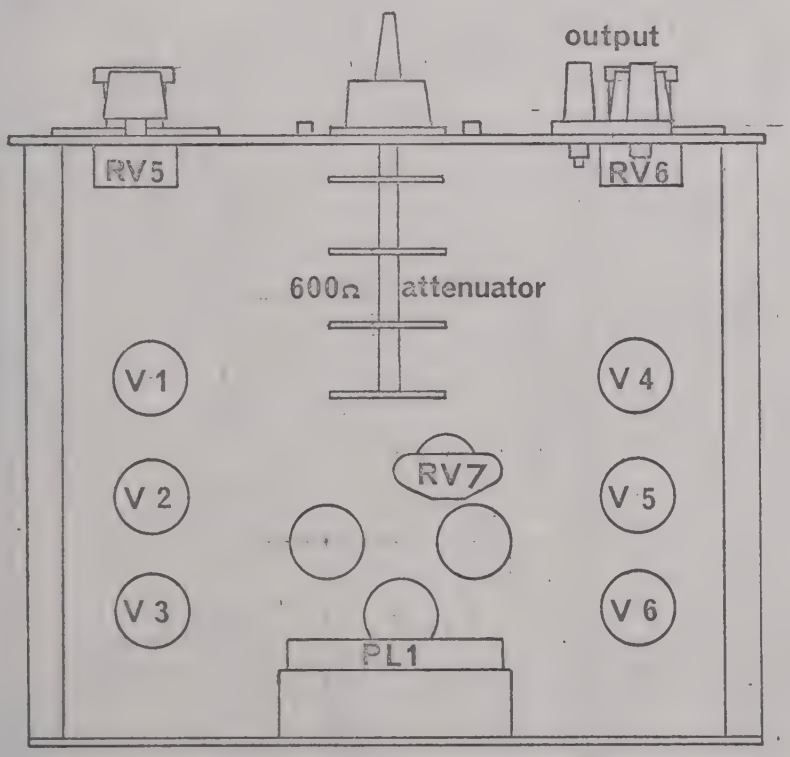
CIRCUIT REF.	DESCRIPTION		
	C A P A C I T O R S		
C9.	Polystyrene	0.01µF	125V d.c.
C10.	"	0.01µF	125V d.c.
C11.	Plastic Film	0.1µF	160V d.c.
C12.	Plastic Film	0.1µF	160V d.c.
C13.	Polyester	·47µF	400V d.c.
C14.	"	·47µF	400V d.c.
C15.	Electrolytic	16+16+16µF	275V d.c.
C16.	Electrolytic	16+16+16µF	275V d.c.
C17.	Polystyrene	100pF	125V d.c.
C18.	"	100pF	125V d.c.
C19.	See C.15		
C20.	See C.16		
C21.	Electrolytic	8µF	150V d.c.
C22.	"	8µF	150V d.c.
C23.	See C.15		
C24.	Polyester	·47µF	400V d.c.
C25.	See C.16		
C26.	Polyester	·47µF	400V d.c.
C27.	"	·1µF	400V d.c.
C28.	"	·1µF	400V d.c.
C29.	"	·047	400V d.c.
C30.	"	·047	400V d.c.
C31.	Electrolytic	50µF	150V d.c.
C32.	"	100µF	12V d.c.
C33.	"	50+50µF	275V d.c.
C34.	"	50µF	150V d.c.
C35.	"	100µF	12V d.c.
C36.	See C.33		
C37.	Electrolytic	8µF	150V d.c.

P A R T S L I S T

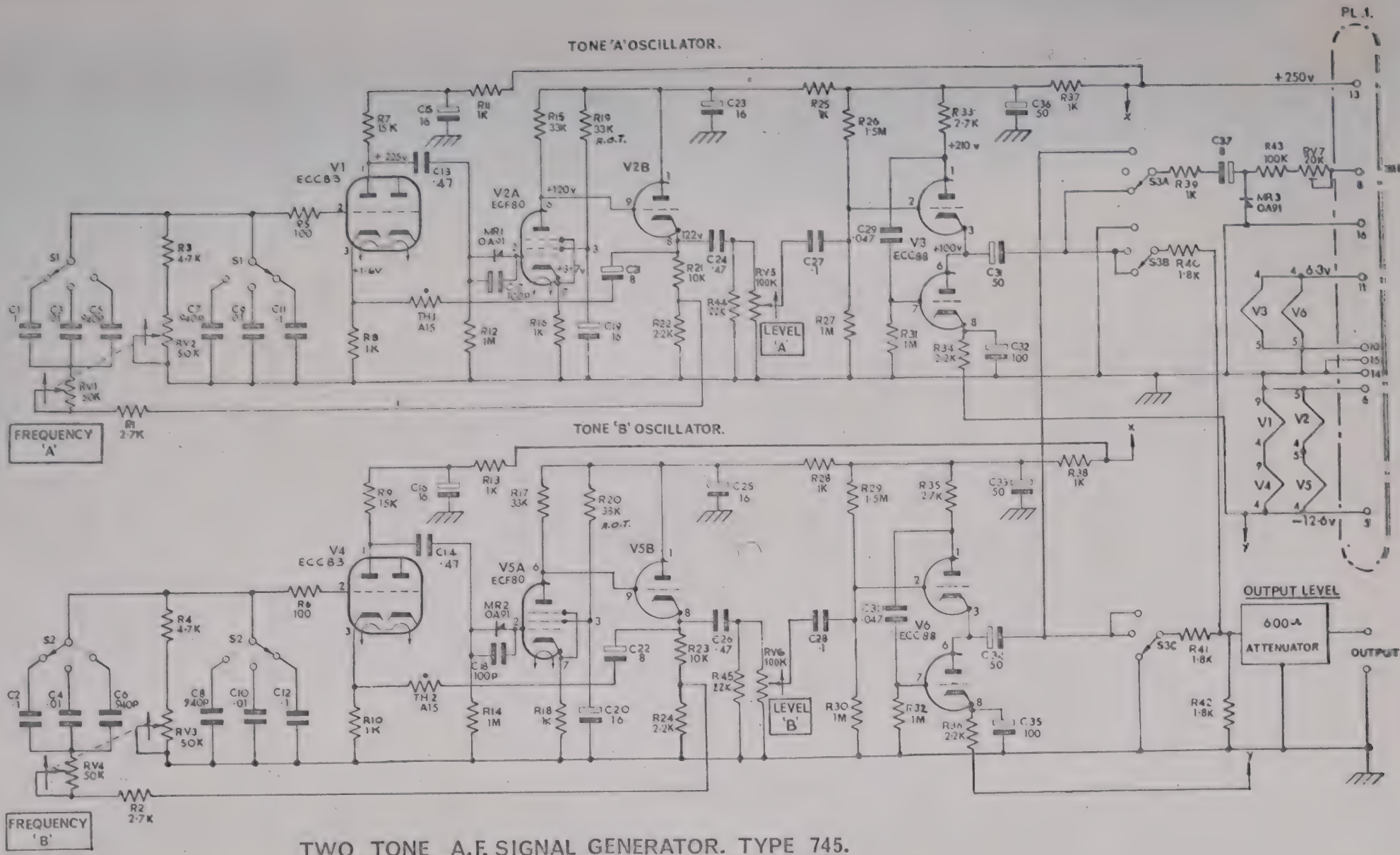
CIRCUIT REF	DESCRIPTION		
	V A L V E S		
V1.	Double triode	ECC83	Mullard
V2.	Triode-pentode	ECF80	Mullard
V3.	Double-Triode	ECC88	Mullard
V4.	Double-Triode	ECC83	Mullard
V5.	Triode-Pentode	ECF80	Mullard
V6.	Double-Triode	ECC88	Mullard
	M I S C E L L A N E O U S		
MR1.	Diode	OA91	Mullard
MR2.	Diode	OA91	Mullard
MR3.	Diode	OA91	Mullard
TH1.	Thermistor	A15	S.T.C.Ltd.
TH.2	Thermistor	A15	S.T.C.Ltd.
PL1.	Plug 16-way Dowel Polarized McMurdo R.P.D.16		
S1.	Switch, slider type	RA2300	Ariel Ltd.
S2.	Switch, slider type	RA2300	Ariel Ltd.
S3.	Switch	Dynar Drg. No.BD 1192	



VIEW ON TOP OF CHASSIS



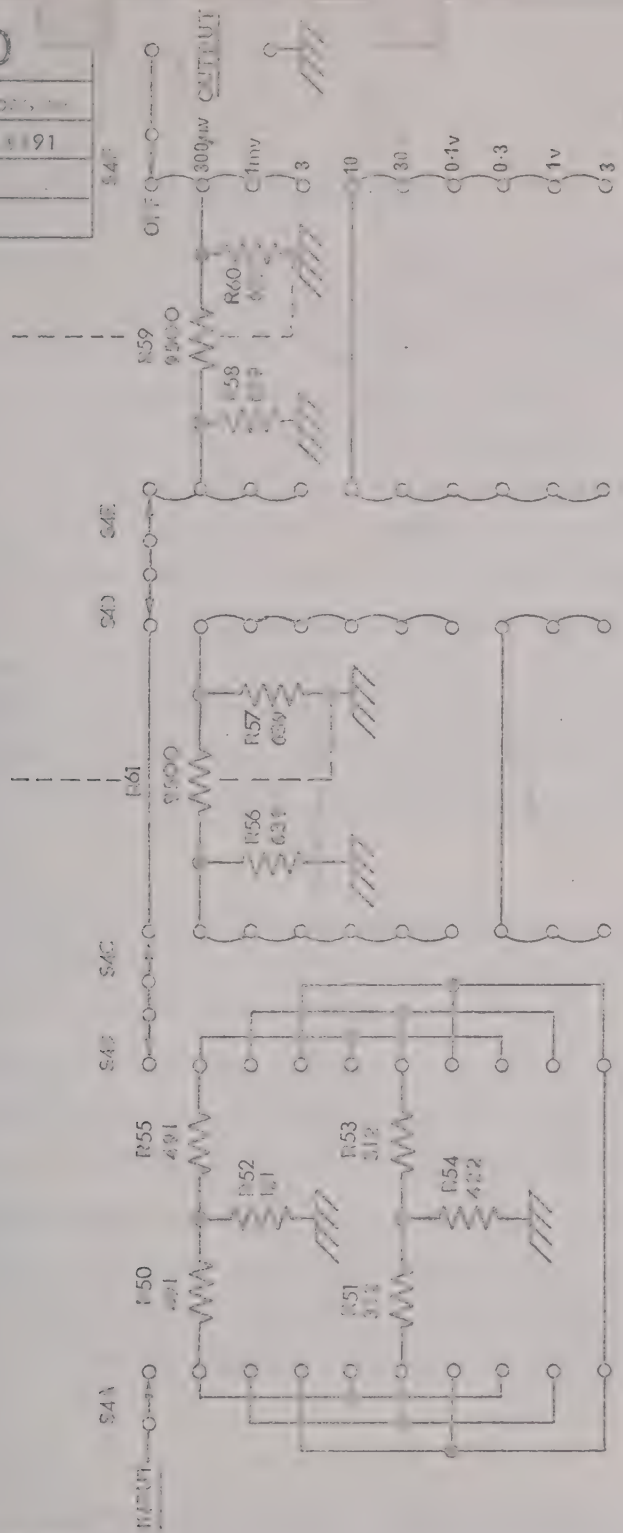
VIEW UNDER CHASSIS



TWO TONE A.F. SIGNAL GENERATOR. TYPE 745.

DRG. No
AC1190

USED ON	ASSY DRG. No
TYPE 745	DA1191



THIRD ANGLE PROJECTION

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FRACTIONAL DIMENSIONS ± ·015. CLEAR HOLES ± ·005
DECIMAL DIMENSIONS ± ·005. ANGLES ± ½°

IMPROVEMENTS APPLY FROM OSCILLATOR NUMBER ____ STARTS

MAT'L ____ SPEC. ____

FINISH ____

ALL DIMENSIONS IN INCHES

DYNAR ELECTRONICS LTD.
WATFORD, HERTS. ENGLAND.

TITLE CIRCUIT DIAGRAM
TWO TONE A.F. SIGNAL GENERATOR
OUTPUT ATTENUATOR.

DRG. No
AC1190

DRN. A RUSSELL 27·2·65

CHK'D. DATE

APP'D. DATE

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